

February 27, 2015

US Environmental Protection Agency
Office of Enforcement and Compliance Assurance
Office of Federal Activities
International Compliance Assurance Division (2254A)
1200 Pennsylvania Ave., NW
Washington, DC 20460

Via UPS Mail

**Re: International Shipments Report for 2014
IBM Essex Junction, VT (EPA ID No. VTD002084705)**

To Whom It May Concern:

There were no international shipments of hazardous waste for the IBM Corporation facility in Essex Junction, Vermont in 2014. As required by 40 CFR 262.56(a) and Section 7-708(c) of the Vermont Hazardous Waste Management Regulations international shipments must be reported. Attached to this notification is an update of the waste minimization activities at IBM. The waste minimization update includes a summary of chemical review procedures, a description of 2014 waste minimization efforts, and activity planned for 2015.

Please contact David Kost at (802) 288-6226 or at dlkost@us.ibm.com with any questions or for further information.

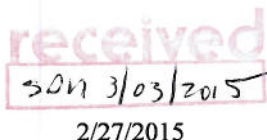
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Sincerely,



Janette Bombardier
Director, IBM Vermont Site Operations & Senior Location Executive

cc: Mr. Marc Roy
Vermont Department of Environmental Conservation
Waste Management Division (via email)



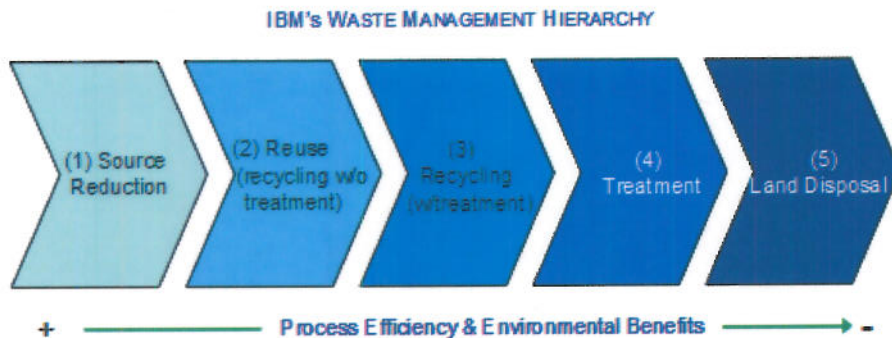
2/27/2015

WASTE MINIMIZATION UPDATE

February 27, 2015

WASTE MINIMIZATION PROGRAMS AND PROCESSES

The IBM Corporation uses the following hierarchy in implementing waste minimization techniques:



IBM Vermont has focused on achieving waste minimization through the implementation and effective management of the following programs and processes, which directly or indirectly aid in minimizing the generation of hazardous waste. These programs and processes are continuously being refined to enhance the site's waste minimization efforts.

- Chemical Authorization Process
 - All chemicals that are new to the site or existing chemicals with a new use are reviewed for environmental and safety impacts. Less toxic substitutes are required when available.
- Process Environmental Impact Assessment
 - All new chemical using manufacturing and facilities equipment are reviewed to identify potential significant impacts to the environment from IBM processes; to consider feasible alternatives for avoiding potential impacts; and to ensure compliance with applicable legal and regulatory requirements.
- Waste Disposal Characterization
 - The site has a waste disposal process that allows containerized chemical waste to be tracked from the point of generation to the point of disposal. Based on the waste characteristics, the proper disposal method is established, including reuse and recycling when feasible.
- Toxics Use and Hazardous Waste Reduction Planning
 - IBM also has a plan identifying source reduction and waste minimization opportunities for all SARA 313 chemicals and hazardous waste streams that fall under the planning requirements, per the requirements of Vermont's ACT 100. Waste minimization efforts are reported to the State of Vermont in the annual Pollution Prevention Progress Report. A new Toxics Use and Hazardous Waste Reduction plan identifying new chemical use reduction and waste minimization opportunities to be evaluated for technical and economic feasibility, was submitted to the State of Vermont July 1, 2014.
- Product Environmental Impact Assessment
 - In addition to its processes, IBM must also ensure that its products do not have a detrimental effect on the environment and that all products are introduced in

compliance with Federal, State, community and IBM Corporate rules and regulations. A Product Environmental Profile is prepared to predict and minimize or eliminate adverse environmental effects of IBM products, both within the manufacturing facility and at the customer location.

2014 WASTE MINIMIZATION RESULTS

Using 2005 as a baseline, the amount of production hazardous waste generated in 2014 was reduced by approximately 50.77% from 2005 (when indexed to production).

RESTRICTION OF HAZARDOUS SUBSTANCES (ROHS)

IBM continued its efforts in 2014 on qualification and introduction of lead-free and lead reduced technologies. IBM worked with our internal and external customers to develop a strategy to phase out lead containing products.

REGISTRATION, EVALUATION, AUTHORIZATION AND RESTRICTION OF CHEMICAL SUBSTANCES (REACH)

IBM Microelectronics Division (MD) also continued the assessment of the newly proposed REACH Substances of Very High Concern (SVHC) list with regards to impact on MD products/packaging. As part of this assessment, IBM worked with supply chain to ensure new SVHC chemicals in 2014 are not in MD products and packaging.

CHEMICAL USAGE REDUCTION PROJECTS IN WAFER MANUFACTURING OPERATIONS

Idling of a Photolithography Tool:

A photolithography tool used exclusively for a technology for which production had dropped in 2014 was idled. There is periodic chemical dispense and daily checks that occur on these types of tools. Idling the tool resulted in a reduction of chemical use and waste generation in 2014 of 213 liters.

Photo process step elimination:

Via solvent wash elimination - extra PGMEA solvent wash for via levels using a different photoresist (UVIHS-0.8 DUV photoresist). This process evaluation started in 2013 and was completed in 2014. This reduces 8370 liters of PGMEA per year.

Water Phase from Bonder/Debonder Tool Segregated for On-site Treatment:

Water waste from this tool is segregated from the solvent waste for on-site treatment at the wastewater treatment plant to maximize on-site treatment and minimize the amount of waste

being sent off site. This tool was brought online in August 2011. In 2014, 114 pounds/day of water was segregated for on-site treatment. If this water was not treated, it would have been sent offsite for disposal as part of the MUV waste stream. Introducing water to the MUV waste stream can also reduce the reclaim potential for the Propylene Glycol Monomethyl Ether Acetate (PGMEA) in the MUV waste stream.

Shut Off Valves at filters for the Bonding and De bonding tool:

Installation of shut off valves at the filter will reduce the use of PGMEA used for filter changes. This project was completed in Oct 2014. This saves approx. 10 gallons (83.5 lbs) of PGMEA, once a year during a filter change.

Photochemical Waste Reduction Efforts

A concerted effort is being made to reduce photochemical waste by improved housekeeping and inventory management practices. This is an ongoing effort during the course of the year. The waste minimization results from this ongoing effort cannot be quantified.

RECOVERY OF FOMBLIN OILS USED IN PRECISION VACUUM PUMPS

Segregation of waste perfluorinated oil allows the perfluorinated oil to be recovered and returned to the site for reuse. In 2014, 3,356 pounds of used Fomblin oil were sent for reclaim instead of disposal.

ON-SITE TREATMENT OF WASTE AT WASTEWATER TREATMENT PLANT

The IBM Vermont manufacturing facility owns and operates a state-of-the-art, NPDES permitted on-site wastewater treatment plant. This wastewater treatment plant consists of four main wastewater treatment processes: Concentrated Wastewater Treatment, Biological Wastewater Treatment, Chemical Mechanical Polish Wastewater Treatment, and Industrial Wastewater Treatment. Utilizing the capabilities of these treatment processes allowed IBM to treat approximately 472,581 pounds of waste on-site in lieu of sending it off-site for treatment. On-site treatment dramatically reduces the number of waste shipments required, reducing the need for transportation of those wastes.

Table 1 below outlines the types and estimated quantities of waste treated in 2014:

Table 1

<i>Waste Stream Name</i>	<i>Portion of Treatment Facility Where Treatment Occurred</i>	<i>Total Treated (estimated pounds)</i>	<i>Percent of Waste Generated</i>
Deep Ultraviolet (DUV) Waste	Biological Wastewater Treatment Plant (BWTP)	353,201	66

<i>Waste Stream Name</i>	<i>Portion of Treatment Facility Where Treatment Occurred</i>	<i>Total Treated (estimated pounds)</i>	<i>Percent of Waste Generated</i>
Ethylene Glycol Solutions	Biological Wastewater Treatment Plant (BWTP)	54,880	100
Miscellaneous Containerized Waste	Chemical Mechanical Polish (CMP) Wastewater Treatment Plant and or BWTP	58,500	100
Miscellaneous Containerized Waste	Industrial WWTP Treatment	6,000	100
TOTAL =		472,581	

DECONTAMINATION FACILITY OPERATIONS

The IBM Vermont facility operates a decontamination facility on site. This facility handles the sorting of contaminated as well as non-contaminated trash. The facility processes corrosive and solvent contaminated trash, scrap metal, plastic, and other materials. Contaminated items are cleaned and decontaminated, where applicable, and sorted into the appropriate waste streams. The decontamination facility also segregates metals, high density plastics, computer boards and modules, wood, silicon parts, and other recyclables into the appropriate recycle streams. In addition, the facility has two bottle wash stations for cleaning empty chemical containers and a cleaning process for chemical Nowpak™ containers.

Decontaminated items leave the facility as recyclable glass, plastic, or metal, or general trash instead of chemical or hazardous waste. In 2014, over 215,110 pounds of waste was decontaminated at this facility.

Table 2 below outlines the types and estimated quantities of waste decontaminated in 2014:

Table 2

<i>Waste Stream Name</i>	<i>Total Decontaminated (estimated pounds)</i>
Glass and Plastic Chemical & Nowpak™ Bottles for Recycle	42,815
Other Plastics for Recycle	8,578
Corrosive Contaminated Trash	47,464
Other Non-Recyclable Trash	2,730

<i>Waste Stream Name</i>	<i>Total Decontaminated (estimated pounds)</i>
Metal Reclaim	160,687
High Density Plastics	3,031
TOTAL =	215,110

DUV AND MID-ULTRAVIOLET (MUV) WASTE STREAMS FOR RECLAMATION

The main constituent in both the DUV and MUV waste streams is Propylene Glycol Monomethyl Ether Acetate (PGMEA). In 2014, the amount of DUV and MUV waste shipped off site was sent for reclaim was 586,880 pounds. The reclaimed PGMEA is used by other companies that can utilize the material at the purity level achieved by reclamation.

REFRIGERANT RECLAIM

In 2014 the boiler room sold refrigerant from a large chiller to a reclaim vendor (Hudson Technologies). This resulted in a \$ 129,216 refrigerant reclaim credit.

POLYIMIDE PLASTIC CONTAINER RECYCLE

In 2014 IBM changed the process of sending spent polyimide waste (BURL0029). The bladder containing the waste polyimide is now taken out of the plastic bottle. In the past the bottle was sent out with the bladder as non-recyclable waste. In 2013 there was 742 pounds sent out for disposal. In 2014 only 240 pounds were disposed of. This process enabled 502 pounds of hazardous waste to be avoided.

N- METHYL-2-PYRROLIDONE (NMP) WASTE RECLAMATION

In 2014, IBM continued to consolidate drummed and bulk NMP waste. This consolidated waste stream was sent off site for reclamation, but is now sent off for fuel blending. The market for the NMP sent for reclamation has changed and needs to be greater than 99% pure. IBM's is only 90-95% pure due to the fact that glycol and NMP have similar distillation temperatures and when it is distilled to purify the glycol comes with the NMP. IBMs used NMP contains 5-10% glycol. One shipment was sent offsite in 2014 as reclaim, current process is now to fuel blend. The total amount of NMP waste sent for reclamation in 2014 was 43,520 pounds. The total amount of NMP waste sent for fuel blend in 2014 was 99,260 pounds.

GLASS MASK RECLAIM

Masks are manufactured in the IBM Vermont mask house and consist of quartz plates covered on one side with a chromium oxynitride film. Phase shift masks also have a molybdenum silicide layer. Most used or defective masks have a market value and are shipped to a vendor where they are stripped to bare quartz. Once stripped of their images the glass is purchased by

the reclaim vendor for reuse. In 2014, 15,003 pounds of glass masks were sent for reclaim instead of being sent off-site for disposal.

ETHYLENE GLYCOL USE IN CHILLERS

A 50/50 ethylene glycol and water mixture is used as a tool maintenance chemical on a large number of semiconductor manufacturing tools in the facility. For the long term, continue to evaluate switching to an alternate chemistry and solid state chillers that would completely eliminate the use of ethylene glycol in this application. In 2014 capital was approved and solid state units ordered for 13 manufacturing tools. The plan is to have all 13 tools converted to solid state chillers by the end of 1Q2015. This will eliminate the use of ethylene glycol using chillers in certain manufacturing tool in the facility.

R-22 REFRIGERANT REPLACEMENT IN CHILLERS

R-22 is used in chillers in certain number of semiconductor manufacturing tools in the facility. In 2014, we replaced 25 Neslab chillers with modified units that eliminate the use of 1.6 lbs of R22 refrigerant in each unit.

GENERAL SOLVENT #4 WASTE REDUCTIONS

A component of the site's groundwater remediation system, a perchloroethylene (perc) separator, was designed to route the solvent phase of the groundwater being pumped for treatment to one of the site's permitted hazardous waste storage tanks (General Solvent #4) and the water phase for internal treatment. In addition, during certain system shutdowns, the perc separator could be bypassed sending large quantities of groundwater to the General Solvent #4 waste tank for off-site disposal. In 2012, due to the concentrations of the perchloroethylene in the ground water being greatly reduced over time, it was determined that the perc separator was no longer providing adequate phase separations within the vessel. IBM obtained permission from the State of Vermont (Waste Management Division) to remove the perc separator and send the groundwater directly through the corrective action programs internal treatment process. IBM completed the removal in December 2012.

With the removal of the perc separator and the connection it had to the General Solvent #4 tank, the amount of water being sent off-site for disposal was greatly reduced. On-going savings in 2014 are over 36,000 pounds of waste for off-site shipment when compared to 2012 baseline.

INDUSTRIAL WASTEWATER TREATMENT PLANT (IWTP) OPTIMIZATIONS

In 2014, the Industrial Wastewater Treatment Plant (IWTP) continued focus on chemical use reductions. Chemical usage was reduced through the following process optimizations:

- Shutdown of one treatment clarifier and part time shut down of a second clarifier;
- Running a slightly higher pH in the equalization basin;
- Running a slightly higher outfall pH;
- Running defoamer only when needed (as opposed to running it all of the time);
- Lime use reduction work to reduce the amount of lime used in the gravity thickeners; and

- Running the EQ basin in bypass mode (as much as possible).

The IWTP continued the shutdown of one process clarifier and shut down a second clarifier for approximately 10% of the year to save on the amount of sulfuric acid, lime, and polymer used in the overall treatment process. The shutdown of this clarifier also reduced the amount of IWTP sludge required for disposal. This is also a significant energy reduction. The overall treatment efficiency of the IWTP was maintained without the use of this clarifier. In tandem with this effort the IWTP ran the EQ basin in bypass mode for approximately 40% of the year. Running in this mode saves the electricity of four 30 horsepower pumps.

In 2014, the nitrate reduction efforts have been going strong and the treatment efficiencies are becoming much more stable. The nitrate discharges for most of the year were at or below the target discharge level of 3.0 mg/l due to the continued diligence and support of the denitrification steps in the biological treatment sequential batch reactors (SBR's).

INDUSTRIAL WASTEWATER TREATMENT PLANT (IWTP) SLUDGE

Although the IWTP sludge falls under the F006 RCRA definition, it meets none of the original listing criteria for F006. Since the sludge is a functionally non-hazardous waste stream, IBM Vermont worked with EPA Region 1 to pursue a federal delisting of this waste.

In 2011, the site worked with EPA Region 1 to finalize a Quality Assurance Project Plan (QAPP). The QAPP outlined all required sampling and analysis for the delisting process. The QAPP was approved and signed by EPA Region 1 in January 2011. Samples were taken and analyzed according to the QAPP and results were submitted to EPA Region 1 in August 2011. EPA Region 1 ran the EPA's delisting model on the data and determined the results to be favorable for proceeding with the delisting.

In September 2012, EPA published the delisting in the Federal Register. In March 2013, after the completion of the first two consecutive sets of quarterly verification testing, EPA approved the sludge waste to be managed as non-hazardous. Since April 2013, IBM has shipped the delisted sludge to a Subtitle D landfill where it is used as alternative daily cover, which is considered a beneficial use for the waste material. In 2014 IBM continued to perform annual sampling and analysis and completed ongoing change evaluations, per the Federal delisting, to monitor the sludge composition and maintain the delisting. In 2014, 5,097,650 lbs of the sludge was used as an alternative daily cover versus being sent off-site as hazardous waste for landfill disposal.

WASTE MINIMIZATION PLANS FOR 2015

Actively work through the year in evaluating and implementing economically and technically feasible waste reduction and toxic reduction opportunities on focus chemicals identified in the pollution prevention and waste minimization plans.

SOLVENT AND RESIST DISPENSE VOLUME REDUCTIONS IN PHOTOLITHOGRAPHY OPERATIONS

Optimizing Photochemical Usage:

Photochemical waste returned as partial or full Nowpaks™ will be tracked and evaluated to determine why the chemical was not fully utilized. Chemical usage trends will also be tracked by toolset to identify any areas for improvement. This is an ongoing activity from 2010.

In addition, reduce photochemical waste through source reductions and shelf life extensions. Photochemical waste will be avoided by reducing the number of photo tools on which the variety of photoresists are deployed, thereby reducing the number of wasted partial or full Photoresist Nowpaks™. In addition, the site engineers will be working with the chemical suppliers to extend the shelf life of the photoresists, where it is determined that the chemical quality remains suitable. This will allow these photoresists to be utilized rather than be disposed of as Hazardous Waste.

Investigate Bonder/Debonder Process for Chemical Use Optimization:

Investigate chemical use optimization on the bonder/debonder process including PGMEA recirculation and adhesive use reduction:

- Recycle PGMEA solvent for wafer debonding adhesive removal, and
- TZNR-A0006 PM adhesive shot size reduction.
- PGMEA rinse process optimization in the Debond step (current process was using rinse recipes from the manufacturer there is potential for optimization)

PGMEA use Reduction in Photolithography Processes:

Investigate PGMEA use reduction options in various photolithography processes:

- Reduced PGMEA photoresist strip for G polyimide - eliminate redundant solvent usage;
- Reduce PGMEA solvent wafer rework volume by 10%.
-

No Polyimide Process on Certain Wafer Technologies:

In mid-2011 a process change was made to certain wafer technologies in which the Durimide 7510 photosensitive polyimide (PSPI) was replaced with a Mid-UV photoresist to resolve a fluorine contamination issue when stripping the PSPI from the wafer with greenhouse gas tetrafluoromethane (CF₄). This process change reduces NMP use in the process. The technical feasibility of this process change on additional process technologies will continue to be evaluated

in 2015.

OFF SITE SCRAP LEADED WAFER RECYCLE

IBM Burlington scrap wafers and wafer pieces, since they contain sensitive information such as defense articles and technical data, fall within unique circumstances where the disposal of this waste must satisfy both the Resource Conservation and Recovery Act (RCRA) regulations and the Arms Export Control Act (AECA). AECA is implemented through the International Traffic in Arms Regulations (ITAR). Previous disposal options were determined in April 2013 to not satisfy specific impairment and destruction requirements as regulated under ITAR. Therefore, IBM has been evaluating alternatives for recycling or disposal of the scrap wafers that meet all applicable regulations. Under Federal Regulations, there is a broad definition of scrap commercial chemical product that applies to these wafers and exempts them from hazardous waste regulation when reclaimed. The State of Vermont has not adopted this specific exemption, so IBM has applied for a variance from the Vermont Hazardous Waste Management Regulations (VHWMR) for scrap wafers and wafer pieces containing lead. Once the variance is approved, expected approval at the end of October, scrap wafers will no longer be considered hazardous waste and will be sent to a certified ITAR destruction facility and then to a lead reclaim facility. The variance approval was received on 01/30/15. We are planning to ship 10,946 pounds next week of leaded wafers that would have been landfilled, but will go for lead reclaim.

DUV WASTE INVESTIGATION

Determine feasibility of increased monitoring of the DUV waste treated onsite by installing a flow meter. This will enable IBM to verify total flows more accurately helping maximize treatment.

INVESTIGATE DECON BOTTLE WASH PROCESS/TOOL FOR GREATER ON-SITE TREATMENT

The Biological waste treatment plant currently treats IPA from manufacturing. The biological waste treatment plant might be able to treat some or all of the IPA from the bottle wash facility. This will be investigated in 2015.

INVESTIGATE NMP RECLAIM OPTIONS

Investigate potential new vendors that could potentially reclaim the NMP to a higher purity level or find a client that can accept 90-95% pure. This will be investigated in 2015.

PHOTORESIST WASTE SEGREGATION FOR SOLVENT RECOVERY

Continue to investigate the possibility of sending low volumes of drummed photoresist waste containing large amounts of PGMEA solvent for recovery if feasible.

INDUSTRIAL WASTEWATER TREATMENT PLANT OPTIMIZATION

In 2015, the IWTP plans to focus on the following projects:

- Lime use reduction in the thickeners which will reduce the sludge volume generated

- Lowering the pH of the treatment clarifiers, which will also use less lime and reduce the sludge volume generated, as well as use less sulfuric acid to get the pH back to neutral before discharging the water to the river.
- Working with smart data. This includes expanded use of the SPC Lab application as well as the using the PI View data recording application in new and enhanced ways. The treatment plant also plans to develop dashboards for the IW, Biopant, and CMP treatment steps. This focus on data should not only help with treatment efficiencies, but help trend chemical usage. With this better tracking the IW plant will be able to see trending and look at chemical usage and reductions in a smarter fashion.
- Working to maximize the shutdown of clarifiers and bypassing the EQ basin to realize electrical, chemical, and sludge generation reductions.

ON-SITE TREATMENT OF SOLVENT, MISCELLANEOUS CONTAINERIZED WASTE STREAMS

Biotreatment of DUV waste and ethylene/propylene glycol will continue in 2015, including continued efforts to determine the maximum practical loading for these waste streams in the BWTP.

Miscellaneous containerized waste treatment through portions of the Industrial Wastewater Treatment Plant (IWTP) and biological waste treatment plant will also continue in 2015 as allowed.

We are installing a concentrated waste (CW) drain drum wash station and aspirator (possibly in Decon) which will not only save man hours in Decon from the manual cleaning of many of these drums, but will allow for expanded treatment possibilities of chemistries that need to be disposed of through a CW drain which is currently not in place.

DECONTAMINATION FACILITY OPERATIONS

The decontamination facility will continue to process corrosive and solvent contaminated trash, scrap metal, chemical bottles, high density plastic, and other materials in 2015. In 2015, IBM plans to continue to improve the efficiency of the decontamination processes and evaluate additional waste streams for addition to the decontamination processes.




UPS CampusShip: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.
2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.
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Customers with a Daily Pickup

Your driver will pickup your shipment(s) as usual.

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DAVID KOST 802.769.2761 IBM - BURLINGTON VT DOC CONTR 1000 RIVER ROAD ESSEX JUNCTION VT 05452-1299	0.0 LBS LTR 1 OF 1	SHIP TO: ATTN: NOTIFICATION INTENT TO EXPORT US ENVIRONMENTAL PROTECTION AGENCY COMPLIANCE ASSUR. DIV. (2254-A) OFFICE FEDERAL ACTIVITIES INTERNATI 1200 PENNSYLVANIA AVENUE, NW WASHINGTON DC 20460-0001	MD 201 9-83 	UPS NEXT DAY AIR 1 TRACKING #: 1Z 023 629 01 9957 7239		BILLING: P/P  CS 17 1 04 WNTNVS0 60 0A 01/2015
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